

We claim:

1. An apparatus for fastening a tissue comprising a stopper, where said stopper includes one or more distal members, and a plurality of proximal member flexibly attached to said stopper, where said clip has a fastened configuration in which said plurality of proximal members oppose at least a portion of said stopper, and an open configuration where said clip is openly restrained from said fastened configuration to accept a tissue, such that tissue positioned within said open configuration is compressed when said fastener is unrestrained.

2. The apparatus of claim 1, said plurality of proximal members is two proximal members.

3. The apparatus of claim 1, wherein said open configuration includes openly restraining said plurality of proximal members.

4. The apparatus of claim 1, wherein said clip is nitinol.

5. The apparatus of claim 1, wherein said clip is of unitary construction.

6. The apparatus of claim 1, wherein said plurality of proximal members are elongated members.

7. The apparatus of claim 1, wherein said one or more distal members is one disk-shaped member.

8. The apparatus of claim 1, wherein said the number of proximal members is equal to the number of distal members.

9. The apparatus of claim 8, wherein said clip has a longitudinal orientation having a centerline, and wherein said proximal members and said distal members are approximately symmetric about said centerline.

10. The apparatus of claim 1, wherein a portion of said stopper has a proximally oriented surface, wherein said stopper is a spring, and wherein said stopper is distally deformable for application of force to said tissue.

11. The apparatus of claim 1, wherein at least one of said plurality of proximal members of said fastened configuration has a distally oriented end, and wherein said distally oriented end of said fastened configuration opposes at least a portion of said stopper.

12. The apparatus of claim 1, wherein at least a portion of said stopper has proximally oriented ends and wherein at least a portion of said plurality of proximal members of said fastened configuration oppose at least one of said proximally oriented ends.

13. The apparatus of claim 1, wherein at least one of said plurality of proximal members of said fastened configuration has a distally facing surface, wherein at least a portion of said stopper has a proximally facing surface, and wherein at least a portion of said distally facing surface of said fastened configuration opposes said distally facing surface.

14. The apparatus of claim 1, further including a restraint mechanism for openly restraining and releasably retaining said clip in said open configuration.

15. The apparatus of claim 14, wherein said restraint mechanism is suture.

16. The apparatus of claim 14, wherein said restraint mechanism is a restraint clip.

17. The apparatus of claim 14, wherein said restraint mechanism is a generally cylindrical tube having an opening for accepting at least a portion of said plurality of proximal members.

18. The apparatus of claim 17, wherein said restraint mechanism has an inner surface for restraining said plurality of proximal members.

19. The apparatus of claim 14, wherein said restraint mechanism releases when said clip is pulled from said restraint mechanism.

20. The apparatus of claim 14, wherein said restraint mechanism releases when said restraint mechanism is squeezed.

21. The apparatus of claim 1, further including a piercing member having a tip and a hollow end for accepting at least a portion of said plurality of proximal members and restrain said clip.

22. An apparatus for fastening a tissue comprising:

a clip having a stopper, where said stopper includes one or more distal members, and a plurality of proximal members flexibly attached to said stopper, said clip having a

fastened configuration where at least one of said plurality of proximal members opposes at least a portion of said stopper; and
a restraint mechanism to releasably restrain said plurality of proximal members of said clip in an open configuration away from said fastened configuration,

5 such that a tissue is placeable within said releasably restrained clip, and where that upon releasing said clip from said restraint mechanism, said plurality of proximal members return towards said fastened configuration to compress said tissue.

23. The apparatus of claim 22, wherein said plurality of proximal members is two proximal members.

10 24. The apparatus of claim 22, wherein said clip is nitinol.

25. The apparatus of claim 22, wherein said clip is of unitary construction.

26. The apparatus of claim 22, wherein said plurality of proximal members are elongated members.

15 27. The apparatus of claim 22, wherein said one or more distal members is one disk-shaped member.

28. The apparatus of claim 22 , wherein said the number of proximal members is equal to the number of distal members.

20 29. The apparatus of claim 28, wherein said clip has a longitudinal orientation having a centerline, and wherein said proximal members and said distal members are approximately symmetric about said centerline.

30. The apparatus of claim 22, wherein a portion of said stopper has a proximally oriented surface, wherein said stopper is a spring, and wherein said stopper is distally deformable for application of force to said tissue.

25 31. The apparatus of claim 22, wherein at least one of said plurality of proximal members of said fastened configuration has a distally oriented end, and wherein said distally oriented end of said fastened configuration opposes at least a portion of said stopper.

32. The apparatus of claim 22, wherein at least a portion of said stopper has proximally oriented ends and wherein at least a portion of said plurality of proximal members of said fastened configuration oppose at least one of said proximally oriented ends.

33. The apparatus of claim 22, wherein at least one of said plurality of proximal members of said fastened configuration has a distally facing surface, wherein at least a portion of said stopper has a proximally facing surface, and wherein at least a portion of said distally facing surface of said fastened configuration opposes said distally facing surface.

5 34. The apparatus of claim 22, further including a restraint mechanism for openly restraining and releasably retaining said clip in said open configuration.

35. The apparatus of claim 34, wherein said restraint mechanism is suture.

36. The apparatus of claim 34, wherein said restraint mechanism is a restraint clip.

10 37. The apparatus of claim 34, wherein said restraint mechanism is a generally cylindrical tube having an opening for accepting at least a portion of said plurality of proximal members.

38. The apparatus of claim 37, wherein said restraint mechanism has an inner surface for restraining said plurality of proximal members.

15 39. The apparatus of claim 34, wherein said restraint mechanism releases when said clip is pulled from said restraint mechanism.

40. The apparatus of claim 34, wherein said restraint mechanism releases when said restraint mechanism is squeezed.

20 41. The apparatus of claim 22, further including a piercing member having a tip and a hollow end for accepting at least a portion of said plurality of proximal members and restrain said clip.

42. A delivery system for fastening a tissue or layer of tissues having an external distal surface and an external proximal surface, comprising:

25 a clip having a stopper, where said stopper includes one or more distal members, and a plurality of proximal members flexibly attached to said stopper, where at least one of said plurality of proximal members has a fastened configuration opposing at least a portion of said stopper; and

a piercing member for piercing a tissue and having a first end, a second end, and an elongated member therebetween, where said first end includes a tip and where said second end includes a mechanism to releasably hold said plurality of proximal

members in an open configuration, and where said stopper of said releasably held clip extends transversely away from said elongated member,
where upon pulling said releasably held clip through said tissue with said stopper adjacent to said distal surface the release of said clip from said needle returns
5 towards said clip towards said fastened configuration and compresses said tissue.

43. The delivery system of claim 42, wherein said plurality of proximal member is two proximal members.

44. The delivery system of claim 42, wherein said clip is nitinol.

45. The delivery system of claim 42, wherein said clip is of unitary construction.

10 46. The delivery system of claim 42, wherein said plurality of proximal members are elongated members.

47. The delivery system of claim 42, wherein said one or more distal members is one disk-shaped member.

15 48. The delivery system of claim 42, wherein said the number of proximal members is equal to the number of distal members.

49. The delivery system of claim 48, wherein said clip has a longitudinal orientation having a centerline, and wherein said proximal members and said distal members are approximately symmetric about said centerline.

20 50. The delivery system of claim 42, wherein a portion of said stopper has a proximally oriented surface, wherein said stopper is a spring, and wherein said stopper is distally deformable for application of force to said tissue.

25 51. The delivery system of claim 42, wherein at least one of said plurality of proximal members of said fastened configuration has a distally oriented end, and wherein said distally oriented end of said fastened configuration opposes at least a portion of said stopper.

52. The delivery system of claim 42, wherein at least a portion of said stopper has proximally oriented ends and wherein at least a portion of said plurality of proximal members of said fastened configuration oppose at least one of said proximally oriented ends.

53. The delivery system of claim 42, wherein at least one of said plurality of proximal members of said fastened configuration has a distally facing surface, wherein at least a portion of said stopper has a proximally facing surface, and wherein at least a portion of said distally facing surface of said fastened configuration opposes said distally facing surface.

54. The delivery system of claim 42, wherein said mechanism is suture.

55. The delivery system of claim 42, wherein said mechanism is a restraint clip.

56. The delivery system of claim 42, wherein said mechanism is a generally cylindrical tube having an opening for accepting at least a portion of said plurality of proximal members.

57. The delivery system of claim 56, wherein said mechanism has an inner surface for restraining said plurality of proximal members.

58. The delivery system of claim 57, wherein said mechanism releases when said clip is pulled from said mechanism.

59. The delivery system of claim 57, wherein said mechanism releases when said mechanism is squeezed.

60. The delivery system of claim 42, further including a piercing member having a tip and a hollow end for accepting at least a portion of said plurality of proximal members to restrain said clip.

61. The delivery system of claim 42, wherein said mechanism releases when said clip is pulled from said mechanism.

62. The delivery system of claim 42, wherein said mechanism releases when said mechanism is squeezed.

63. The delivery system of claim 42, wherein said mechanism is a generally cylindrical opening in said posterior end having a cavity for accepting at least a portion of said plurality of proximal members.

64. The delivery system of claim 42, wherein said piercing member is flexible.

65. The delivery system of claim 42, wherein said piercing member is nitinol.

66. A delivery system for fastening a tissue or layer of tissues having an external distal surface and an external proximal surface, comprising:

a piercing member;

a flexible member having a first end attached to said piercing member, and a second end; and

a clip releasably attached to said second end, said clip having a stopper including one or more distal members, and a plurality of proximal members flexibly attached to said stopper, where at least one of said plurality of proximal members has a fastened configuration opposing at least a portion of said stopper, where said clip is releasably attached to said flexible member with said plurality of proximal members in an open configuration having said stopper extending transversely away from said piercing member,

where upon pulling said releasably held clip through said tissue and said stopper adjacent to said distal surface, the release of said clip from said second end returns towards said clip towards said fastened configuration and compresses said tissue.

67. The delivery system of claim 66, wherein said plurality of proximal members is two proximal members.

68. The delivery system of claim 66, wherein said piercing member is flexible.

69. The delivery system of claim 66, wherein said piercing member is nitinol.

70. The delivery system of claim 66, wherein said flexible member is suture.

71. The delivery system of claim 66, wherein said flexible member is nitinol.

72. The apparatus of claim 66, wherein said open configuration includes openly restraining said plurality of proximal members.

73. The apparatus of claim 66, wherein said clip is nitinol.

74. The apparatus of claim 66, wherein said clip is of unitary construction.

75. The apparatus of claim 66, wherein said plurality of proximal members are elongated members.

76. The apparatus of claim 66, wherein said one or more distal members is one disk-shaped member.

77. The apparatus of claim 66, wherein said the number of proximal members is equal to the number of distal members.

78. The apparatus of claim 77, wherein said clip has a longitudinal orientation having a centerline, and wherein said proximal members and said distal members are approximately symmetric about said centerline.

79. The apparatus of claim 66, wherein a portion of said stopper has a proximally oriented surface, wherein said stopper is a spring, and wherein said stopper is distally deformable for application of force to said tissue.

80. The apparatus of claim 66, wherein at least one of said plurality of proximal members of said fastened configuration has a distally oriented end, and wherein said distally oriented end of said fastened configuration opposes at least a portion of said stopper.

81. The apparatus of claim 66, wherein at least a portion of said stopper has proximally oriented ends and wherein at least a portion of said plurality of proximal members of said fastened configuration oppose at least one of said proximally oriented ends.

82. The apparatus of claim 66, wherein at least one of said plurality of proximal members of said fastened configuration has a distally facing surface, wherein at least a portion of said stopper has a proximally facing surface, and wherein at least a portion of said distally facing surface of said fastened configuration opposes said distally facing surface.

83. The apparatus of claim 66, further including a restraint mechanism attached to said second end for releasably attached said clip to said flexible member

84. The apparatus of claim 83, wherein said restraint mechanism is suture.

85. The apparatus of claim 83, wherein said restraint mechanism is a restraint clip.

86. The apparatus of claim 83, wherein said restraint mechanism is a generally cylindrical tube having an opening for accepting at least a portion of said plurality of proximal members.

87. The apparatus of claim 86, wherein said restraint mechanism has an inner surface for restraining said plurality of proximal members.

88. The apparatus of claim 83, wherein said restraint mechanism releases when said clip is pulled from said restraint mechanism.

89. The apparatus of claim 83, wherein said restraint mechanism releases when said restraint mechanism is squeezed.

90. A delivery system for fastening a tissue or layer of tissues having an external distal surface and an external proximal surface, comprising:

- 5 a piercing member;
- a flexible member having a first end attached to said piercing member, and a second end;
- a restraint mechanism attached to said second end; and
- a clip releasably attached to said restraint mechanism, said clip having a stopper
- 10 including one or more distal members, and a plurality of proximal members flexibly attached to said stopper, where at least one of said plurality of proximal members has a fastened configuration opposing at least a portion of said stopper, where said restraint mechanism releasably holds said plurality of proximal members of said clip in an open configuration with said stopper extending transversely away from
- 15 said suture,
- where upon pulling said releasably held clip through said tissue and said stopper adjacent to said distal surface, the release of said clip from said restraint mechanism returns towards said clip towards said fastened configuration and compresses said tissue

20 91. The delivery system of claim 90, wherein said plurality of proximal members is two proximal members.

92. The delivery system of claim 90, wherein said piercing member is flexible.

93. The delivery system of claim 90, wherein said piercing member is nitinol.

94. The delivery system of claim 90, wherein said flexible member is suture.

25 95. The delivery system of claim 90, wherein said flexible member is nitinol.

96. The apparatus of claim 90, wherein said clip is nitinol.

97. The apparatus of claim 90, wherein said clip is of unitary construction.

98. The apparatus of claim 90, wherein said plurality of proximal members are elongated members.

30 99. The apparatus of claim 90, wherein said one or more distal members is one disk-shaped member.

100. The apparatus of claim 90, wherein said the number of proximal members is equal to the number of distal members.

101. The apparatus of claim 77, wherein said clip has a longitudinal orientation having a centerline, and wherein said proximal members and said distal members are approximately symmetric about said centerline.

102. The apparatus of claim 90, wherein a portion of said stopper has a proximally oriented surface, wherein said stopper is a spring, and wherein said stopper is distally deformable for application of force to said tissue.

103. The apparatus of claim 90, wherein at least one of said plurality of proximal members of said fastened configuration has a distally oriented end, and wherein said distally oriented end of said fastened configuration opposes at least a portion of said stopper.

104. The apparatus of claim 90, wherein at least a portion of said stopper has proximally oriented ends and wherein at least a portion of said plurality of proximal members of said fastened configuration oppose at least one of said proximally oriented ends.

105. The apparatus of claim 90, wherein at least one of said plurality of proximal members of said fastened configuration has a distally facing surface, wherein at least a portion of said stopper has a proximally facing surface, and wherein at least a portion of said distally facing surface of said fastened configuration opposes said distally facing surface.

106. The apparatus of claim 90, wherein said restraint mechanism is suture.

107. The apparatus of claim 90, wherein said restraint mechanism is a restraint clip.

108. The apparatus of claim 90, wherein said restraint mechanism is a generally cylindrical tube having an opening for accepting at least a portion of said plurality of proximal members.

109. The apparatus of claim 108, wherein said restraint mechanism has an inner surface for restraining said plurality of proximal members.

110. The apparatus of claim 90, wherein said restraint mechanism releases when said clip is pulled from said restraint mechanism.

111. The apparatus of claim 90, wherein said restraint mechanism releases when said restraint mechanism is squeezed.

112. A method for fastening a first tissue and a second tissue with a clip delivered to said tissue in a holder, said method comprising:

5 piercing the first tissue;

piercing the second tissue

passing said holder through said piercing, where said clip is releasably coupled to said holder, where said clip has a stopper and a plurality of terminator arms, where said clip has a coupled configuration releasably restraining said at least two terminator arms in said holder with said stopper extending approximately perpendicular from said holder, and where said clip has a decoupled configuration where said plurality of terminator arms and said stopper are opposable across said tissue;

seating said stopper of said coupled clip against said first tissue; and decoupling said clip,

15 such that said at least one terminator arms returns towards said disengaged configuration and opposes said stopper across said tissue.

113. A method for creating an intima-to-intima tissue contact between a first tissue and a second tissue each having an adventitia and an intima with a clip delivered to said tissue in a holder, said method comprising:

20 piercing the adventitia of a first tissue;

piercing the intima of a second tissue

passing said holder through said piercing, where said clip is releasably coupled to said holder, where said clip has a stopper and at least two terminator arms, where said clip has a coupled configuration releasably restraining said at least two terminator arms in said holder with said stopper extending approximately perpendicular from said holder, and where said clip has a decoupled configuration where said at least two terminator arms and said stopper are opposable across said tissue at more than one location;

seating said stopper of said coupled clip against said adventitia of the first tissue; and decoupling said clip,

30 such that said at least one terminator arms returns towards said disengaged configuration and opposes said stopper across said tissue, and such that the intima of the first tissue is in contact with the intima of the second tissue.